THE Chemist

APRIL, 1945 VOLUME XXII, No. 4

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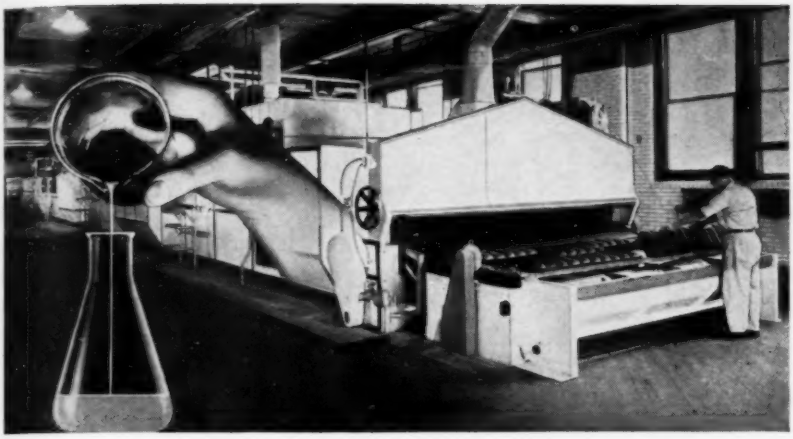

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Patent Use and Development Section, Office of the Alien Property Custodian

DURING World War One, about 12,000 foreign-owned United States patents were seized by the Custodian, and as a result our synthetic ammonia, nitric, sulfuric and methyl alcohol industries and our dye manufacturing industry were established. Our pharmaceutical industry was also made somewhat independent of foreign control.

During the present war, the Alien Property Custodian has seized about 45,000 similar patents, including many pending applications which previously had not been open to the general public. Approximately 20 per cent of these are of a chemical nature. Thus, through this seizure, rights to the inventions of our enemies which have been protected by patents in this country are now being turned to the advantage of our own citizens for use in prosecuting the war against those enemies.

The very large number of patents involved in this more recent invasion of foreign interest into our patent structure and the time required to digest each one, have been so great that an over-all picture of the present situation could hardly be obtained until these patents were abstracted and indexed and this mass of material reduced to a size that could be handled.

Such abstracts have just been announced by the Custodian, James E. Markham. They have been divided into two major groups—the Chemical and the Mechanical-Electrical. The Chemical Abstracts, prepared by the Chicago Section of the American Chemical Society, contain the abstracts or short descriptions of 8,000 chemical vested patents classified into 31 major sections, and cover such diversified fields as chemicals, metals and alloys, fertilizers, foods, textiles, explosives, plastics, petroleum, synthetic rubber, unit processes, industrial waste utilization, etc.

The indexing was done by the Science-Technology Group of the Special Libraries Association and comprises 400 pages covering over 30,000 items mentioned in the abstracts.

The Mechanical-Electrical Abstracts, which cover about 37,000 pa-

[1]Condensed from the paper presented before the Chicago Chapter of the A.I.C., February 9, 1945.

tents (about 4,300 pages plus an index), consist of a statement of a claim of the patents and a reproduction of the drawing as published in the *Official Gazette* of the United States Patent Office. These patents are grouped according to the classification system used by the Patent Office. Much chemical process apparatus and chemical engineering equipment will be found in this group.

Perhaps now we can evaluate these patents and take the Intelligence Quotient of these foreign interests as disclosed by the German IG[2] and similar patents. As space does not permit a detailed discussion of all the abstracted[3] patents, only some of the more important and typical ones will be here discussed with a view toward indicating the part they are playing in our war economy and their probable significance to the industrial future of the United States.

Agricultural Chemistry

The agricultural chemist will find over 250 patents on fertilizers, plant growth stimulants, nutrient salt solutions, insecticides and disinfectants, herbicides and horticultural processes. The fertilizer patents show a definite trend toward the preparation of mixed, compounded or simultaneously crystallized salts of calcium, ammonium and potassium particularly as the cyanide, cyanamide, nitrate, phosphate, chloride and carbonate, with particular emphasis placed on their preparation in a non-caking, easily spreadable granular form. Peat, lime, phosphate and potash rocks, manures, leather scrap and slaughterhouse waste are recommended as raw materials.

Foods

Bromates, iodates, hydrogen peroxide, alkaline gases, hydrogen cyanide gas, quick freezing, and smoking are claimed as suitable food preserving agents. Dehydration, powdering, fortifying with vitamins, and the compressing of foods like meats, fish, cereals, milk, and vegetables are each given appreciable consideration. Means have been found for preventing the blackening of canned corn and crabs. Several plants based on these are now in operation in the United States.

The use of vegetable oils for sealing in the flavor of tea, the compressing of tea for storage, and also the means for improving the flavor of your morning cup of coffee might be of immediate interest to you. Other patents deal with de-alcoholizing and de-sugaring beers, de-caffeinized coffee, de-theinized tea and substitute cocoas.

Paints, Lacquers, Enamels and Varnishes

There are many patents on anti-corrosion, waterproof submarine and ship, fire and rust resistant, lustrous, colored, and transparent paints, var-

[2]Interessen Gemeinschaft Farbenindustrie Aktiengesellschaft, Frankfort on the Main.

[3]Copies of all the abstracts are obtainable from the Chicago Office of the Alien Property Custodian.

nishes, lacquers and enamels. In addition to the aldehyde-phenol, methyl vinyl ketone, urea, and amine resins, many vinyl and butadiene halides, tall-oil derivatives, cellulose ethers and esters, chloroprene and chlorinated rubber, and castor oil polymer paint patents might well be worth further investigation. Novel combinations are reported for improving luster, viscosity, adhesion of the paint to the base and for the preparation of many pigments.

Pharmaceuticals

Among the pharmaceutical patents we find directions for making sulfa drugs, barbiturates, alkaloids, arsenicals, cardiacs, and hormones, vitamins, antiseptics, and cosmetics. A specially purified acetylene is claimed to be non-poisonous and capable of destroying the plasmodia of malaria if introduced into the blood during a malarial paroxysm. If these claims can be substantiated by clinical test, our present production of anti-malarials may be profoundly affected.

Photography

In the photographic field are quite a few patents dealing with the preparation of emulsions for papers and plates, sensitizers and de-senzitizers, toning agents, screens and printing. A few light sensitive dyes are also mentioned.

Catalysis

One of the largest groups of patents is that dealing with catalytic reactions which effect in a single step, large scale production of many organic chemicals previously produced only through several more complicated steps. The I. G, as you know, has been most active in this field. By using specialized catalysts, chlorination, oxidation, hydrogenation, hydration, dehydrogenation, cracking, aromatization, and condensation are all well under control. The emphasis is, however, on methods for synthesizing hydrocarbons which, with some degree of after-treatment, are suitable for use as fuels, or as raw materials for synthetic rubbers and for plastics.

Metallurgy

These patents fall into three major groups: (1) Purification of ores of aluminum, magnesium beryllium and zirconium so as to keep down the concentration of impurities in the final metal. (2) Preparation of the alloys with specific mechanical properties designed particularly for airplane use, and (3) the after treatment of the surface of the alloy to render it corrosion resistant, The emphasis placed on the aluminum and magnesium alloys we can readily understand, The use of beryllium in light metals and in copper is quite well known.

But the detailed analysis and the lists of mechanical properties given for the numerous magnesium alloys in which zirconium is used as a deoxidizer, grain size controller and tensile strength improver, indicate to how great an extent these airplane alloys have been developed. Zirconi-

um is also recommended for imparting cicatrizing properties (the self healing of cracks) to light metal alloys rendering them stable in sea water. While cerium has been recommended for these uses in the past, the use of zirconium instead of cerium releases this for more essential uses.

The methods for the after-treatment of light metal alloys to increase abrasion and corrosion resistance include modification of anodizing such as baking, heating with paraffin, treatment with chromates, electroplating with manganese dioxide, etc.

Numerous patents give detailed directions for the preparation of pure non-ferrous alloys, of aluminum and magnesium, oil-less bearings and bearing metals, the sintering of carbides and carbo-nitrides for cutting tools, new beryllium coppers, and for high temperature resistant bronzes. Similar data are presented for the preparation and heat treating of the chrome steels, the free cutting and the high speed steels, bearing metals, sintered carbides and carbo-nitrides for cutting tool tips, permanent magnet steels, etc. Over 100 patents treat of powder metallurgy and sintering. A wide variety of protective coatings for metals, special welding rods and solders are also disclosed.

Organic Chemicals

Over 900 of these patents disclose methods for producing organic chemicals of a most varied nature. It is in this field, and particularly in that corner of it dealing with catalytic organic synthesis, that the I. G. has proved itself a master of molecular architecture and has fortified itself within a most compact, interlocked, yet all inclusive pyramid of protective patents.

Starting with such simple raw materials, as by-product carbon dioxide, carbon monoxide, hydrogen from any source like water gas and cracked petroleum gases, and with air or ammonia and a catalyst, it has been able to synthesize alcohols, acetals, aldehydes, ketones, acids and esters. By chlorinating, cracking, isomerizing, aromaticizing, polymerizing singly or in combination, by adding an atom or radical here or taking one away there, building upward or working downward in any series, almost any desired compound can now be commercially produced.

For example, numerous patents deal with the production of acetylene from hydrocarbons, and with its subsequent purification, chlorination, polymerization, and reactions to form acetals, solvents, synthetic rubber and plastics. The synthetic organic acids obtained by the oxidation of petroleum, oils and paraffin, brown coal by-products, etc., are recommended for use in varnishes, as paint viscosity reducers, as plasticizers, in the preparation of lubricating oils and when sulfonated, as wetting agent intermediates. Acrolein and acrylic acid and their derivatives are recom-

mended as raw materials for many plastics, and as adhesives for cellulose, laminated glass, leather finishes and water-proof plywood. Alcohols and derivative solvents and other organics are made from petroleum gases, paraffin wax, carbon monoxide, and hydrogen.

The developments in the organic adhesive field are typical of what may be disclosed by these patents. Some of the newer adhesives contain water soluble ureas, vinyl esters, combinations of vinyl methyl ketone and aldehydes, vinyl esters of halogenated fatty acids, lignin sulfuric acid-amine derivatives, glues and gelatines, rubber, starch esters, casein, albumin derivatives, nitrocellulose and celluloid.

Fuels

The patents dealing with fuels show a very definite trend toward the conversion of all types of carbonaceous materials into synthetic liquid fuel of the high anti-knock gasoline, and the Diesel and the rocket fuel types. Among the raw materials mentioned are alcohol, coal, brown-coal, lignite, peat, mineral and shale oils, carbon monoxide, hydrogen, petroleum residues, etc.

Many different conversion methods are presented with the emphasis placed on cracking hydrocarbon oils to unsaturated hydrocarbons and on the Fisher-Tropsche type of catalytic synthesis. There are also several patents covering octane number improvement, anti-knock agents, gum removal, gum inhibitors and hydrogenation of gasolines. Numerous patents deal with gaseous fuel manufacture from wood, charcoal, etc., for motor vehicle use and also with briquetting of mixed fuels for heating purposes. One safety gasoline of low vapor pressure is also mentioned. This may be of value in flame throwers.

While many of these methods of fuel production may not be of much immediate interest to us in view of our present petroleum reserves, the patents do point to some of the ways we may have to follow in the future, if we are to continue to keep our gasoline hungry ,motor driving population satisfied.

Plastics and Synthetic Resins

Synthetic resins and plastics described in about 580 patents are recommended for such diverse applications as frictionless bearings, break bands, commutator insulation, traffic signs with imbedded light reflectors, light polarizing films, varnishes and adhesives, plastic zipper fasteners, surgical sutures and drains, base exchange resins for purifying water, artificial sausage skins, artificial sponges, safety glass, shellac substitutes and even power belting. Plastics may even be electroplated if you so desire.

The newer types of plastics are typified by the Esselmann patents on "Thiolite," a non-brittle chemically

resistant, condensation product of phenol and formaldehyde or their homologues, and sulfur chloride or its homologues, which can be used as an electric or heat insulator, a binder for automobile cylinder block gaskets, pipe insulation, etc. Some of these are soluble in acetone, carbon tetrachloride. and alcohols while the higher homologue derivatives like those made from ethylene imine have higher melting points and are insoluble. Elemental sulfur may be added to further modify the thermoplastic properties of the final resin. This new type may lead to a series of products similar to leather.

Another type, based on the condensation and polymerization of carbon disulfide or its homologues, a cyclic amine and an aromatic iso- or isothiocyanate, is claimed to be suitable for films, foils, coatings, ribbons, bristles, artificial horsehair, fibres, threads, etc., is resistant to dilute acids and dilute bases and can be easily dyed by acid wool dyestuffs. Many of the newer resins have been designed to have specific physical properties and many may be readily dyed.

The 580 patents on plastics and synthetic resins are distributed as follows:

glyptol—alkyd	13
phenol—aldehyde	66
urea—aldehyde	50
linear polymers (including polyamides)	51
vinyl resins	94
cellulose products	154
miscellaneous	152

In other words, the trend is definitely toward the cellulose type. This trend is further indicated by the 227 patents on wood products, paper and paper pulp, many of which indicate methods for the preparation of the purified cellulose as the intermediate.

Textiles

The textile patents indicate a trend toward (1) using chemical surface treatments for both natural and synthetic fibers to facilitate direct dyeing, modifying luster, increase resistance to moisture, moths, vermin, mildew, shrinking, creasing, and fire, and increasing the bending and tensile strengths and elasticity, (2) developing basically new synthetic fibers with increased melting points to resist the heat of the smoothing iron, greater resistance to water, acids, and alkalis used in laundering and dyeing, and (3) changing the physical shape of synthetic fibers to simulate natural wools, silks, etc.

Among the newer cellulose derivatives are the aryl-alkyl cellulose esters, like ethyl cellulose acetate mixed with benzyl cellulose, recommended for spun threads and which are relatively stable to water, the amino cellulose derivatives which take acid wool dyes; the reduced viscosity cellulose ethers and the high viscosity celluloce esters; the acetate-stearate

esters for film, coatings and thread formation; the elastic celluloses which seem to be vulcanized cellulose naphthenate - oleate - sulfur combinations; and even cellulose foils suitable for use as gold beaters skins.

Paper

Among the patents on the fabrication of paper we find many dealing with the manufacture of the following kinds: Abrasive (water resistant), bleached, carbon, cigarette, coated, colored, dielectric, fireproof, watermarked, glossy, laminated, metalized, parchmentized, safety (for checks, etc.), softened, stencil, and transparent.

The emphasis put on the recovery of de-inked paper and the use of straw, flax, hemp, potato and tomato stalks as paper stock certainly indicate the recognition by the Germans of the need for new sources of cellulose. These patents when considered along with the exceptionally large number dealing with plastics and textiles derived from cellulose, indicate a very definite trend in foreign technology, away from the aromatic and aliphatic chemistry to the chemistry of cellulose.

This trend is further indicated by the following table of the approximate number* of vested patents in each of the major groupings:

1. Electrochemistry	200
2. Photography	250
3. Protective Coatings	270
4. Elastomers and Synthetic Rubber	300
5. Dyes and Dyeing	350
6. Foods	350
7. Pharmaceuticals	400
8. Inorganic Chemicals	620
9. Organic Chemicals	640
10. Metals and Alloys	780
11. Petroleum Fuels	810
12. Plastics and Resins Textiles (Natural and Artificial Fibers) Wood, Paper and Pulp	1230

*These figures refer to vested patents of all the nations involved, and are not applicable to only the I. G. patents.

Summary

The surprising thing disclosed by this survey is the increasing number of patents devoted to plastics, resins and synthetic textiles and to wood and paper pulp, i,e., to cellulose chemistry. To me this indicates a very definite trend in foreign technology which cannot be ignored. It is in this field that Germany has let us "get her number". Does Germany intend to continue her cellulose industries after the war? If so, what would that mean to us?

We have heard a great deal about our diminishing supplies of wood suitable for chemical cellulose production. We have no natural silk production and our wool production is not sufficient for our needs. We have plenty of cotton, it is true, but cotton clothes have their limitations. Does this survey then mean that, while we

must still continue our research activities in the pharmaceutical, metals and alloys, petroleum and synthetic rubber fields, etc., we must now concentrate our efforts on the newer plastics and textiles, particularly those derived from cellulose?

Should we embark on a nation-wide program of reforestation? What can be done to get greater cellulose yields from the wood we are now cutting? Can we synthesize cellulose from our abundant raw materials such as coal and petroleum? What new plastics and textiles do we need? How can we produce them? The vested patents have, I believe, shown some of the ways. Can we use these, and perhaps add a few of our own so as to meet the inevitable international competition in this field, as we have in the others, which at various times have threatened our national economy?

A patent wall of 45,000 interlocking building blocks had been built around American industry. When it is realized that the average vested patent has about seven or eight more years to run, the hold these nationals have had on our industries can be imagined. You know the foundations were laid years before Pearl Harbor. About 8,500 of these patents have been licensed to American citizens and corporations.

Many of these cover our present day production of war materials such as optical pyrometers, tungsten carbide cutting tools, surgical, diagnostic, and scientific instruments. High strength rayon yarn for use in cord tires, parachute fabric and shroud lines, synthetic wool and other fibers, dehydrated castor oil, ion exchange resins for water softening, leather tanning agents, a rubber accelerator, synthetic rubber, gate valves, cement, and of course the host of vested patents dealing with electronics and ordnance, are all now being manufactured under these licenses.

Thus a breach has been made in that patent wall. It is now up to American industry to demolish it completely and, using the vested patents as foundation stones, to mold them with characteristic American diligence and imagination into a lasting chemical industry in this country. This will build up our military machine, help us to defeat Axis economic warfare in the export markets of the world and make us independent of foreign chemical control.

The I. G. has been at it again. This time it is aided by other powerful foreign interests, but now we have their number. By putting these patents to work today, by continued research on them in the future, we can obtain lasting value from them. We can beat the I. G. at its own game. Shall we accept this challenge?

Precision in the Field of Biochemistry

M. X. Sullivan, Ph.D.

Georgetown University, Washington, D. C.

An Address Before the Baltimore Chapter,
THE AMERICAN INSTITUTE OF CHEMISTS

THE phenomena of living are, in their ultimate analysis, fundamentally chemical. The celebrated French chemist Lavoisier, as a conclusion or as a result of his work on combustion of material within and outside the animal body, early declared that life is a chemical phenomenon. This conclusion was about 1785. Some years later in 1793 he was beheaded by the revolutionists. In holding to the concept that chemistry is the final basis of industry, therapeutics, and the general study of life activities, I am merely travelling with the modern train of thought. In the field of biochemistry, chemistry is making rapid strides in which I have been playing some stiumulating roles.

For the estimation of important biological constituents, I have devised many methods—published and unpublished, not only for amino acids but also for various vitamins C, D, K, etc. We will limit our discussion to several amino acids, cystine, tryptophane, phenylalanine, and several important amines, benzedrine, isoamylamine, etc.

The two subjects, amino acids and amines go hand in hand, and the two sub-subjects, the sulfur-containing amino acids and amines have always been closely related in my vision, teaching, and researches. As far back as 1918, I was studying the secretions and excretions of patients in the Pellagra Hospital, Spartanburg, South Carolina. As a result of this study I came to the conclusion that wherever life exists two conflicting fields of chemistry had to be considered:

(1) The presence of injurious material formed in the body or coming from outside.

(2) The defense against these injurious compounds.

In 1918, I started on the determination of amines in the urine of pellagra cases as compared with normals. This was large scale work and gave me some results but not as satisfactory as I hoped. As determined by the weight of the phosphotungstic acid precipitates from equal volumes of the respective urines, pellagrous and normal, the pellagra urines contained material acting like amines. I made an attempt at fractionating the precipitates and ended with a long

series of small amounts of possible amines, too small to identify through the knowledge I had then. I did report the presence of indolethylamine in the urine of patients in J.B.C.46, xxxix, 1922. However, while in this amine field in 1918, I fell upon the sulfur as a defense mechanism. Thus the saliva of normals was found to give a red color with a trace of ferric chloride and HC1, while the saliva of acute cases of pellagra did not. The first paper on this subject was given here in Baltimore before the Society of Biological Chemists, April, 1919. This finding led to a study of cystine. In 1926 I published a detailed article on a highly specific test for cysteine applicable to cystine suitably reduced.

This test was positive with cysteine or with cystine suitably reduced. It was negative with compounds containing the SH group alone; by compounds containing NH_2 alone. It was negative with isocysteine NH_2 $CH_2CHSHCOOH$; negative with cysteine amine $SHCH_2CH_2NH_2$ negative with homocysteine CH_2 $SHCH_2CHNH_2COOH$; and negative with a new compound which we may call beta homocysteine synthesized in my laboratory CH_2SH-$CHNH_2CH_2COOH$.

Having at hand a color reaction of a high degree of specificity, we applied it during the years 1926-1940 in widely different fields and published a long series of papers dealing with cystine in proteins, in enzymes, in hormones, the relation of cystine to oxidation and reduction mechanisms, to biochemical defense, to arthritis, tuberculosis, and cystinuria. Some of the findings are depicted by the slides:

Slides:

1, Pellagra patients. 2, Pellagra producing diet. 3, Pellagra curing diet. 4, Some characteristics of pellagra urine. 5, Histidine and histamine. 6, Detoxification of phenol. 7, Detoxification of indole. 8, Reagent for amines-later for cysteine. 9, Cystine and cysteine. 10, Cystine crystals. 11, Reduced glutathione. 12, Methionine. 13, Ergothioneine. 14, Work with phaseolin. 15, Work with wool. 16, Rate of liberation of cystine. 17, Studies of various proteins, 18, Study of enzymes. 19, Urease, 20, Prolactin and pituitary. 21, Finger nails, normal and in arthritis. 22, Arthritis. 23, Further work on arthritis. 24, Cystinuria. 25, Basic amino acids of arthritic fingernails. 26, Molecular ratio of basic amino acids normally and in arthritis. 27, Action of NaCN on cystine, Action of sodiumamalgam. 28, Cysteine and cystine and aldehydes. 29, Cysteine and cystine and sugars. 30, Thiazolidines, 31, Denaturation. 32, 33, Oxidation-reduction studies with cysteine and cystine and oxidized and reduced glutathionine. 34, 35, Various amines

formed from amino acids by decarboxlation.

From our own work we knew that the cysteine reaction obeyed Beer's law, a finding recently verified by Csonka, using a spectrophotometer.

Under certain conditions large amounts of thioglycollicacid may interfere with cystine test. This compound has not been found in proteins, tissues, or excreta. If present we can readily prevent it from interfering with the cysteine-cystine tests.

Our early work was done with the Dubosque colorimeter and we used not less than 0.5 mg, per each 5 cc. Recently we acquired a Klett-Summerson photoelectric colorimeter. With this instrument the results were questionable until more dilute solutions were employed. With the Klett-Summerson the proportionality is absolute from 0.1 to 0.5 mg per 5 cc.

The estimation of cysteine in the presence of cystine: We have several procedures for the estimation of cysteine and cystine when together, but the most satisfactory procedure is that of Sullivan, Hess, and Howard. Called in to estimate both in the presence of each other in the study of viruses, hormones, and denatured proteins we devised a satisfactory procedure. This procedure goes in two steps:

(1) Treating the solution with 2 cc 5% NaCN (Slide 27). In this reaction RSSR plus NaCN equals RSNa plus RSCN.

With cystine as standard: To 5 cc containing 1 mg cystine, add 2 cc freshly prepared 5% aqueous NaCN, run the regular Sullivan cystine reaction and determine cystine.

(2) Reduce the solution with 0.2% sodium amalgam-using 7 cc of solution approximately 0.1 N as respect HCl plus 1 cc amalgam. Let stand 1 hour. All the cystine is now reduced to cysteine. Match against cysteine or cystine similarly reduced with NaHg.

1 minus 2 gives cysteine, 2 minus the cysteine gives cystine.

The results of various mixtures of cysteine and cystine are given in Slides 28 and 29.

Another sulfur compound-methionine $CH_3SCH_2CH_2CHNH_2COOH$ occurs in protein. For this I devised a colorimetric reaction depending on the reaction of sodium nitroprusside and methionine in strong alkali to give an intense yellow which on acidification becomes brilliantly red.

For many years it was known that cystine sulfur explained only a part of the total sulfur of most proteins, then Mueller, in 1921, isolated a new sulfur containing amino acid from casein, and Barger and Coyne in 1928 gave its constitution and its name. Rose showed it to be a dietary essential and Brand et al. postulated that it was converted to cystine in the animal body. By

means of our cystine - cysteine, methionine tests applied to proteins we showed that cystine plus cysteine plus methionine explains the total sulfur in most proteins.

In our work with various proteins, enzymes, etc we brought about great improvement in methods of hydrolysis, in procedures for reducing cystine, and in the interpretation of denaturation of proteins. Some of these findings I will cover in the explanation of the slides.

In dealing with organic sulfur compounds in tissues we also have to take into account two other sulfur compounds, glutathionine and ergothioneine. For both compounds we have delicate and precise procedures, especially for glutathione.

Ergothioneine (Slide 13) is a sulfur compound isolated from blood by Benedict, 1925, Benedict, Newton, and Behre, 1926, and by Hunter and Eagles, 1925, 1927. It is identical with a base isolates from Tanret, in 1909, and shown to be the betain of thiohistidine. Outside of the red blood cell and slightly in the urine we have had little occasion to work with ergothioneine.

Glutathionine (Slide 11): Little if any free cysteine or cystine can be found normally in the organs of the body. In the tissues. the sulfur system exists as glutathionine, a peptide of glutamic acid, cysteine, and glycine, chemically. glutamyl-cysteinyl-glycine. This complex is regarded as playing an important role in intracellular breathing, oxidation and reduction and in biochemical defense. It is certain that there is a higher glutathione content in young and actively growing tissues. The sulfur in glutathione is very easily liberated and it is quite possible that one of the functions of this substance is to liberate active sulfur to aid in detoxifying injurious material-and may even be a detoxified form of cystine which is toxic at high levels of feeding. As regards the organic sulfur compounds in general, I feel safe in saying that they offer a fruitful field of research in various pathological conditions and can be intelligently handled since we have good qualitative and quantitative tests for them.

Now some remarks may be made on biogenous amines. Microorganisms, bacteria for example, may degrade the amino acids formed from proteins in the gastro-intestinal canal to acids or amines. Some of the amines, histamine from histidine, tyramine from tyrosine, phenylethyl amine from phenylalanine have potent physiological action. In the literature of medicine, cadaverine from lysine and putrescine indirectly from arginine are often mentioned. We find them in urine in cystinuria. Isoamylamine from leucine is regarded as a possible cause of death in obstruction of the bowels. To make a long story short, amines can be formed by bacterial flora of the intestines especially in sluggish

Developments in Protective Coatings

Rollin H. Wampler

Technical Director, Southern Varnish Corporation, Roanoke, Va.

I BELIEVE that the most outstanding development in the protective coatings industry during the past year, from the point of view of the chemist, has been the vast improvement in drying oils and synthetic resins made possible by the wider use of tetramethylolmethane, or pentaerythritol, and polymers of the compound. Most alkyd resins and all drying oils in the past have had glycerine, a trihydroxy alcohol, as a vital part of their structure. These materials are fundamentally esters of glycerine and fatty and other organic acids.

Pentaerythritol is a tetrahydroxy alcohol. Polymers of the compound formed through an ether linkage have even greater functionality. By replacing glycerine with this type of material, many properties are improved. Polypentaerythritol has even made it possible to use tall oil, a by-product of the kraft paper industry, in protective coatings.

So significant has been this development that pentaerythritol has become quite scarce.

Perhaps the greatest single problem facing the industry just now is that of making the best possible coatings from available raw materials. The constantly changing supply picture has made vast ingenuity necessary for the manufacturer to operate at all. Nevertheless, the paint industry last year had one of the greatest years in its history.

intestines or in a condition known as stasis of the bowels. For a number of the biogenous amines we have delicate and highly specific tests as shown in slides 34 and 35, and by these tests we are opening a new field of research of great value and interest in health and disease.

Lodder with American Chemical Society

William B. Lodder, M.A.I.C., formerly senior chemist with Diamond Alkali Company, is now technical assistant to Charles L. Parsons, at the Washington headquarters office of the American Chemical Society.

PATENTS: ...They Insure Technological Progress and Gain for the Millions

R. J. Dearborn

President, Texaco Development Corporation

Reprint from THE TEXACO STAR

IF it were possible to eliminate all the technological improvements made since the United States patent laws were enacted and turn the clock back 100 years, we would find that every man, woman, and halfgrown child would be required to toil from sunrise to setting sun and on into the night in order that everyone in this country might have the bare necessities of life according to modern standards—food, rough clothing, and a place to live.

Some have argued in the past that labor-saving devices create unemployment, but this concept has long been exploded. It is now generally recognized that technological improvements and discoveries not only have improved the standard of living by providing thousands of desirable although not necessarily essential things, but also have provided gainful employment for millions to release other millions from the drudgery of hand labor.

What we once regarded as luxuries are now found in possession of every resourceful and progressive workman in this country. The farmer of today is a business man equipped with tractors, reapers, harvesters, and an endless variety of other tools and equipment. Cows are milked by machinery and the cream separated mechanically. Under these conditions it is not remarkable that the United States can feed the world.

The workman of today has his automobile, radio, automatic refrigerator, and vacuum cleaner; many already have in their homes automatic heat regulators, oil burners, or coal stokers. The automobile has encouraged hundreds of thousands to live beyond urban areas. A few years hence the airplane will greatly widen the limits of suburban life.

The President has recognized the importance and value of technological improvements by establishing recently the National Patent Planning Commission headed by Dr. Charles Kettering and comprising Owen D. Young, Chester C. Davis, Edward F. Mc Grady, and Dr. Francis P. Gaines. To them he has propounded the question: "What methods and plans might be devised to promote inventions and discoveries which will increase com-

merce, provide employment, and fully utilize expanded defense industrial facilities during normal times?"

The founders of this country recognized the value of technological improvements and delegated to Congress through the Constitution the power "to promote the progress of science and useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries."

Abraham Lincoln said that the patent grant adds the fuel of interest to the flame of genius. The advantage of the American patent system for promoting technological improvements, developments, and inventions has never been seriously questioned until recent years, and then only for the following reasons:

(1) Defects and weaknesses in the procedure for prosecuting patent applications, which should be and are being corrected. The present commissioner of patents, Conway P. Coe, has courageously fostered constructive legislation which has already done much good.

(2) Failure on the part of certain industrial groups and also on the part of the Department of Justice to differentiate fairly and properly between the patent grant and its proper sphere on the one hand, and illegal monopolies which violate the anti-trust laws on the other. Occasionally the patent grant has been made the excuse for an illegal monopoly. At other times *proper* patent agreements have been unjustly condemned from the anti-trust point of view. The former assistant attorney general, Thurman Arnold, in vigorously and successfully attacking illegal monopolies, clearly overshot the mark and threatened to kill the goose that lays the golden eggs of technological advance.

Some who concede the value of inventions and improvements have argued that the patent system has been outgrown and that modern developments would proceed without it. There seems little reason to accept this view as correct even though, to a certain degree, inventions and discoveries have always come from individuals with creative minds.

To the question "Is there some other more effective way to promote and encourage technological inventions and improvements?" I believe the answer is "No."

Since the beginning of the patent system, practically everyone has conceded that the grant of a patent encourages invention on the part of individual thinkers. Without patent protection, the inventor is helpless. He cannot safely disclose his invention to a prospective buyer. He cannot, with confidence, attempt to interest capital in backing his invention, *even if it is assumed to be complete in a commercial form.* As a matter of fact, his broad inventive concept may require the expenditure of hundreds of thousands of dollars in development

and research before it can be marketed in economical and commercial form.

Some inventions actually are merely broad concepts; they are the seeds from which commercially important developments may grow. For every one of this type, there are a large number of improvement and development inventions which result from painstaking work in research laboratories, shops, and refineries in endeavoring to make the broad concept of immediate and economic commercial value.

If technological improvements are of value and are to be encouraged, it is equally important not only to encourage the broad concept but also to encourage the development and outgrowth of the innumerable improvements which produce the most desirable commercial developments—those developments which put men to work by the thousands in the production of the desired article or in carrying out a modernized process whereby better results are obtained.

The modern automobile has several thousand parts. Who can measure the hundreds of thousands of men and their families who are directly or indirectly connected with, and supported by, the manufacture and supply of all these parts and in assembling the finished machine; also the thousands more engaged in using and servicing automobiles in trade? It is important to encourage the production of the best and most efficient spark plug for the engine as well as to provide the simplest and most reliable starter.

If the grant of patent protection to promote broad inventive concepts is important, it is clearly even more important to promote all such new improvements and developments as are essential to commercial success. Patent protection must therefore cover novel and useful inventions of all classes—whether they fall into the category of broadly new concepts or of newly-developed improvements.

The protection the grant of a United States patent is intended to give is the justification for the employment of several thousand men in the oil industry on research, and for the annual expenditure of millions of dollars. Without the patent system, a large part of this expense would not be warranted. What work was necessary would be done behind closed doors, and secrecy would be the only possible protection.

Secrecy, unsuccessfully maintained, destroys incentive and removes the justification for research expenditures. If successfully maintained it is contrary to the best interests of the nation and defeats the aim of the patent system by preventing the disclosure of the invention for an indefinite period of time instead of its being added to the public domain upon the expiration of the patent.

A high percentage of the inventions and discoveries made every year in this country are *based on the foundation of issued, and even expired, pat-*

ents or grow out of the disclosures contained therein. Issuance of a patent to cover a valuable process encourages other workers in the same industry to devise a competitive process. Thus the patent grant serves not only as an encouragement to the inventor to whom the patent is granted, but also greatly stimulates inventions and developments on the part of others.

Those who believe that the American patent system has been the very backbone and foundation of the wonderful technological advances made in this country are greatly concerned by decisions recently rendered by the Supreme Court of the United States and certain other Federal Courts. These show a tendency to overlook entirely the value of the patent system in promoting technological advance and improvement by calling for a new and unreasonable test for the determination of patentable invention.

In a comparatively recent case decided by the United States Supreme Court, Justice William O. Douglas said of a thermostatically-controlled cigar lighter for automobiles that ". . . The new device, however useful it may be, must reveal *the flash of creative genius,* not merely the skill of a calling. If it fails, it has not established its right to a private grant on the public domain." (Italics mine).

Justice Learned Hand of the Second District Court of Appeals has said ". . . We cannot, moreover, ignore the fact that the Supreme Court, whose word is final, has for more than a decade or more shown an increasing disposition to raise the standard of originality necessary for a patent. In this we recognize *'a pronounced new doctrinal trend'* which it is our 'duty, cautiously to be sure, to follow, not to resist.'" (Italics mine).

For years before the advent of the modern iconoclasts, our law had developed along a different line marked by numerous well-tested precedents. We find a summary of these earlier decisions in the standard textbook known as *Walker on Patents* (Del. Ed.), page 114, which states: "The law draws no distinction between those operations of the creative faculties which may result from long consideration, study, and experiment, and those which reach their end by sudden intuition, accident, or from a flash of thought."

The fact that an invention may flow from steady experimental work as well as from a sudden inspiration was recognized in a Federal Court decision as early as 1863, and a number of specific decisions since that time have specifically reaffirmed that fact.

Federal Judge Mortimer L. Byers, in following the "pronounced new doctrinal trend" when rendering a decision in one case nevertheless added: "The approved approach to most unsolved problems is the studious and often plodding one, and no reliable

substitute has been suggested, even though a solution thereby accomplished is not judicially deemed to attain to the status of a patentable invention. Such is the minimizing lens supplied to a district judge for scrutinizing a patent submitted for adjudication."

As late as 1923 the basic principle stated in *Walker on Patents* still held good and was applied in a Federal Court decision.

It would appear from the "new doctrinal trend" that any scientist who reaches his goal after a lifetime of experimental work on a recondite problem may be refused a patent as a penalty for his alleged "plodding"—especially so if he has been laboring from day to day in the bad company of other researchers who are, of course, likewise "plodders" upon the supposedly smooth and well-paved high road of advanced science. On the other hand, anyone who has a bright idea out of the ethereal blue (i.e., a flash of genius) while in the detached attitude of a morning shave must be recognized as an inventor entitled to patent, since his thought sprang full-blown and full-grown from his mind, like Minerva from the forehead of Jupiter, or Venus from the foam of the waves.

Even Judge Learned Hand, who played an important part in turning the law upon this strange tangent, seems to have suffered mental qualms on certain occasions when he faced the full import of the new departure from old precedents. In deciding a case in 1935 he apparently grudgingly conceded that *some* research (working by trial and error in the time-honored fashion) may result in inventions which are entitled to the protection of the patent law. At that time he said: ". . . It seems to us that the patent does not rest upon an authentic invention, but upon one of those steps in an art which demand only patient experiment. Especially in chemistry it is possible to proceed by a system of trial and error, varying formulas by permutation and combination, and recording the results of each. *Much that is valuable has been so discovered,* and we will not say that the profitable survivals from such elimination *can never be inventions;* salvarsan for example, as its other name, '606,' indicates, was hit upon by this method." (Italics mine).

But some of our courts have not stopped to look and listen in the wild pursuit of their predilections on this subject. A good example will be found in the recent decision by Judges Thurman Arnold, Miller, and Edgerton of the Court of Appeals for the District of Columbia where (stripping the case to its bare frame) a scientist was refused a patent because his invention was made in the large research laboratories of The Bell Telephone System in which planned experimentation had been conducted in the modern way. The net conclusions were very well summarized as follows:

"The corporate research laboratory of today has given us the greatest invention of modern times, the knowledge of how to invent. Under a disorganized system of invention a hundred men would hunt for a needle in the haystack, the prize going to the successful finder while the efforts of the others served only to scatter the hay in all directions. Organized invention has changed the entire process. Each man is given a section of the hay to search. The man who finds the needle shows no more 'genius' and no more ability than the others who are searching different portions of the haystack."

Certainly such decisions fail entirely to recognize that the public welfare demands that the patent grant encourage and promote the production of new and useful technological improvements which create employment and expand commerce, regardless of whether they result from a flash of genius or from persistent effort. We find no word in the Constitution or in the patent statutes to warrant such discrimination.

Patents properly granted to cover technological improvements provide the necessary safeguards to enable exchange of technical data and information between inventors in the same art. The tremendous value of such exchanges has been demonstrated during recent months in the extremely rapid development and perfection of processes for the production of synthetic rubber by an exchange of information among all those who have done any creative work in the field.

If such exchanges are desirable in time of war, they are also desirable in time of peace, and industry should be encouraged to proceed with such arrangements. Such exchanges are certainly not encouraged by criminal indictments for alleged violation of the anti-trust law. In order to encourage all proper exchanges and agreements which tend to promote trade and competition instead of to create monopoly, I favor a clarification of the law to remove the present uncertainty, and favor a statutory provision for the recording of all agreements pertaining to patents and inventions.

Every American workman has a real interest to see the United States patent system maintained, because tchnological improvements have given him the power to earn a living on the high American standard by short hours of labor.

Every American youth is interested in developing new technological improvements, because they add fields of activity in which he may rise to new heights of success and satisfaction.

Every ingenious American is interested in obtaining patent protection on his inventive ideas so he can put them to use for the country and for himself.

Every American corporation and business, both large and small, is in-

terested in technological advances which help produce better products, permit wider sales at lower prices—which, in short, insure continued existence and profitable growth.

The United States patent system is the backbone and justification of research and development expenditures to accomplish these ends. Surely it is worthy of protection and preservation in this day of rampant and unreasoned change.

Approximately 100 years ago, our then incumbent commissioner of patents resigned his office saying that he felt all possible inventions and discoveries of real importance had already been made and patented, and that he wished to turn his efforts to some other endeavor. Alexander the Great, too, lamented because there were no more worlds to conquer.

Modern technologists will never have cause to emulate these persons of short foresight. Each new advance opens new vistas. There will always be new worlds to conquer. Let us not destroy the incentive to conquer them or remove the time-honored rewards for such conquest, all of which are represented in the American Patent System.

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Gustav Egloff spoke before the Wabash Valley Group of the Indiana Section of the American Chemical Society, at Terre Haute, January 18th, on "Synthetic Products from Petroleum."

Gustav Egloff, President, A.I.C., addressed a combined meeting of chemical, mechanical, civil, electrical, and refrigerating engineers, sponsored by the American Institute of Refrigerating Engineers, before the Engineers' Club in St. Louis, Missouri, on March eighth. His subject was "The Engineer in the Oil Industry."

Bjorksten Now Consultant

Johan Bjorksten, F.A.I.C., formerly chemical director of the Quaker Chemical Products Corporation, has established an independent industrial reesarch organization at 185 North Wabash Avenue, Chicago 1, Illinois. A brochure describing Dr. Bjorksten's organization is available on request.

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The Heyden Chemical Corporation's plants at Garfield and Fords, New Jersey, have been awarded a star for their Army-Navy "E" flag in recognition of continued excellence in war production.

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The New York Branch of the American Pharmaceutical Association has Robert A. Hardt, vice-president of the E. R. Squibb and Sons, and Lt. Col. Joseph G. Noh, of the Army Procurement Medical Division, as speakers at its April 9th meeting at Fordham University. Mr. Hardt's subject is "The Modern Pharmacists' Role as a Consultant in Therapeutics." Colonel Noh's subject is "The Pharmacist in the World Today."

Safety In Chemical Laboratories

Joseph B. Ficklen, F.A.I.C:

Presented Before the Southern California Section of the American Chemical Society

MY PURPOSE is to enumerate many of the points which should be considered in making a chemical laboratory as safe a place as practicable to work. The potential hazards and dangers of many chemicals from the fire, explosion, and poisoning standpoint are always with us, but by a little forethought the chances of accident to human beings and property can be substantially minimized.

Also, I wish to awaken in the chemist an awareness of hazards and the need for safety in the laboratory, by thinking safety, more is actually accomplished in the prevention of accidents than any amount of physical safeguarding, although the latter is helpful.

Figures from the National Safety Council for chemical laboratories reporting in the period of 1938-1942, reveal one death resulted in every 89 injuries, and one permanent partial disability in every six injuries in the laboratory. There was a 35 per cent increase in the number of injuries in chemical laboratories during 1942 over 1941, although no data on the frequency of fatalities or permanent partial disabilities with respect to injuries are available. Later accident figures have not been released.

I have been recently connected with munitions manufacture, where we assembled 40 millimeter anti-aircraft shells, employing more than 10,000 persons. We loaded many carloads of shells per day, and such operations involved the handling, melting and pelleting of T.N.T., the pelleting of tetryl, the compounding of tracer, detonator and percussion cap mixes, the drying of black powder and the handling of large quantities of smokeless powder. During 20 months of operations, no one was killed and only two people were seriously injured.

One of the primary reasons for such a safety record was that from the time that the first shovelful of dirt was turned in the construction operations to the actual full-plant activities, accent was placed upon having the plant built with the highest safety standards, and having it operate with safety first and afterwards quality and quantity of production. It is important that the accent on safety come from the top management.

Shortly after we started operations, the Chairman of the Board of this company paid a visit to our plant. After a short tour of the plant he said it was his belief that too much smokeless powder was being allowed in one of the loading lines. I was able to use this interview over and over again in the safety work at the plant to show subordinate personnel that if the highest official in the company was so interested in safety as to take time out from other pressing matters to discuss it, it consequently behooved everyone constantly to be on the alert to minimize hazards.

In regard to the chemical laboratory, it is a good idea to get started straight. So if we are in the rare position of being able to build our laboratory certain things should be borne in mind. Some of these are:

Laboratory rooms where flash fires or explosions might occur should preferably be located on the ground floor. Where the building is of fire resistant construction and where exits are enclosed, dangerous operations may be placed on upper floors except where local laws or regulations forbid it. In such rooms, the operations most likely to cause such accidents should be placed as far as possible from room exits. The building should, where possible, be of fire resistant construction. Sprinklers should be provided to supplement portable fire extinguishing equipment.

Portable fire extinguishing equipment should be preferably placed in hallways. If placed in actual laboratory rooms they should be away from the door and away from principal fire hazard. All fire extinguishers should be tested according to a definite schedule to see that they are in good operating condition. A tag showing the date of the last charge or inspection should be attached to each extinguisher. On each floor, unobstructed exit facilities should be provided on at least two opposite sides of the building. All exit doors should open outward and have clear wired glass inserted in the upper panels. Where there is an explosion hazard, several extra exits should be provided and one or two should be of the chute or slide type, completely enclosed and leading directly to the ground.

In regard to exhaust ventilation systems a great deal depends upon the exact work in the laboratory. For example, in small laboratories in which analysis of simple solutions are made, the only exhaust problem might be the hydrogen sulfide problem, while in large industrial and research laboratories, the problem may approach that of a production department in the chemical plant proper. The general ventilation system should comply in all respects with requirements of the State Department of Labor, and if there are no requirements, then those of the American Standards As-

sociation should apply for ventilation. There should be inlets and outlets at both top and bottom of rooms to take care of gases and vapors lighter or heavier than air. A sufficient number of air changes per hour should be made to hold the toxic air contaminants below the generally accepted maximum permissible limits.

In regard to hoods, since diffusion velocity of gases and vapors into still air does not exceed one foot per minute (fpm), and natural convection not more than 25 to 50 fpm, it is generally safe to accept a minimum face velocity at the hood at 70 fpm. However, many concerns go as high as 200 fpm at the hood face. In regard to exhaust systems, there are two very important points which should not be overlooked in regard to exhaust ventilation in any safety program. The first is, "Is there a possibility of recirculation or pick-up of contaminated air?" and second, "Is the efficiency of the ventilation system checked at periodic intervals?" I once checked a ventilation system in which the fan blades had been almost entirely eaten away, and yet the assumption had been made that the system was functioning with its initial effectiveness.

Illumination in laboratories should be of the best. Where good daylight is not available it may be necessary to supply artificial special illumination of as high as 50 foot candles. Fluorescent lighting is very helpful in many locations, and recently there has been placed on the market explosion-proof fluorescent lighting fixtures, which although expensive, are acceptable in inflammable gas exposures.

In regard to the disposal of refuse from laboratories, drain pipes are generally constructed of high silicon cast iron or other acid resistant materials. Cold water flushing in many drains can be used to advantage. Oils, gasoline, carbon bisulfide, or other volatile and inflammable liquids should not be poured down drains. There have been too many cases of vapors from these materials getting up through sewer traps even remote from the drain into which they were poured, causing fires and explosions. Where there is considerable amount of questionable material to be disposed of, someone competent to handle the matter should do it rather than the usual janitors' service.

I recall one case at our plant where metal tanks used to ship 20 millimeter anti-aircraft shells were sent to our activity for shipping our 40 millimeter primer bodies to another plant. These containers had cardboard linings which we pulled out and began to dispose of on an ordinary burning lot. It happened that several unused 20 millimeter shells were caught up from these containers and thrown into the fire along with the cardboard. Luckily, the refuse men were obeying safety instructions and had retired a

safe distance even though supposedly only burning cardboard, so that when these shells went off no one was injured.

The storage of oil-soaked rags may present a problem. They should be preferably kept in metal containers with closing covers and emptied every night. Where large quantities of them have to be stored in outside storage they should be wet down continuously. Separate receptacles for broken glassware are helpful in protecting janitors handling these items.

The whole laboratory should be arranged so that it can be kept clean and this should be insisted upon. The same maxim applies to a chemical laboratory as does to an explosive plant in regard to cleanliness. Cleanliness is not next to Godliness. In other words, if you don't want to see your Maker, keep the place clean.

In the storage of chemicals and other hazardous materials, larger articles should be stored as near the floor as possible. Glass tubing should be stored preferably horizontally and kept off the floor. Chemicals in large amount which might react together to give off dangerous fumes or cause fire or explosion on accidental breakage should be stored remote from one another. *The correct labeling of bottles is a most important point.*

At this point, it is well to inject the other safety maxim applicable to most chemical operations as well as laboratory. The first, as I stated above, was good housekeeping. It has been said in an explosive plant that one should be able at any time to eat off the floor or tables. Why not the same in the chemical laboratory? The second maxim is to keep down the quantity of combustible, flammable or poisonous chemicals to a minimum in or around any operation.

Every new student or employee should be taught how to operate fire extinguishing equipment. It is surprising how many people do not know how to do this. The first time I had a fire in a laboratory, I had to read the directions on the extinguisher while the fire was burning in order to operate it. Such matters as the securing of compressed gas cylinders, the fire polishing of glass tubing, the drinking of water from beakers rather than using a drinking fountain are too obvious possibly to mention. However, each and every one of us violate safety precautions in this respect probably many times a year.

In touching back briefly on the point that safety interest must emanate from top management, it is well to remember that if we violate safety precautions in these respects, what can we expect from the people under us? The use of personal protective equipment, such as face hoods, sleeve aprons, coveralls, are well known, and if conscientious effort is made to employ these protective devices a great deal will be accomplished.

Attention should also be paid to

the exposures to gradually accumulative or occupational disease poisonings. We all know of mercury poisoning, benzene poisoning, and radium poisoning. Just recently, I was in two laboratories which had very interesting exposures along these lines. The first laboratory, engaged in titration work in synthetic rubber, used hot benzene as the medium in this titration. After titrating, the entire contents of the flasks were dumped into a metal garbage can which was located in such a way that the fumes of the can were drawn by a suction of the exhaust hood, in which the titration was conducted, directly past the breathing zone of the titrator. Obviously, this was poor practice. The second case occurred where small amounts of radium paint were tested in a laboratory. Here, although ventilation was provided and the operators' work places were immaculate, small residues of the paint were thrown on wiping tissue into a fiber wastebasket. Readings taken on the fiber wastebasket with a Geiger-Muller counter showed an exposure of 250 micrograms of radium in paint accumulations on the sides of this basket. Furthermore, up until the time of our investigation, the contents of this basket had been disposed of by ordinary burning in the plant incinerator; whereas, this radium should have been returned to the vendor.

In closing, there are certain items I wish to mention again. First, good housekeeping. Secondly, the use of as small amounts of materials as practicable in the working area. Third, the education and instillation of safety consciousness in the individual worker, which is most easily done by top management showing that they are personally interested in safety. There is more need for organizational activities in regard to safety, such as mentioned in the *News Edition* of February 25, 1942, in regard to the Alpha Chi Sigma, which has initiated a safety program for its chapters located in 46 American colleges and universities.

There is also a need for more publicity in regard to accidents presently occurring in chemical laboratories. There is a certain natural reticence on the part of laboratory directors in giving out this information, in that they feel it reflects upon themselves. However, a much broader outlook on these matters is that if it has happened once, why not use its lesson to prevent accidents to others.

Emphasis placed on these five avenues of attack will do a great deal to make the laboratory just as safe a place to work in as the front office.

Nathan Smith, F.A.I.C., formerly chemist-in-charge at Towns and James, New York, has opened an analytic and research laboratory at 47 Ann Street, New York 7, N. Y., as a consulting service to the pharmaceutical profession.

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THE February meeting was held on the 15th at Taix French Restaurant, Los Angeles. Minutes of the previous meeting were read and accepted. A draft of the proposed By-Laws was presented by Mr. C. W. Henning, and discussion of By-Laws was held over to the March business meeting. Dr. Albert Salathe introduced the forum topic for the evening, "Improvement of the Professional Status of the Chemist," and requested each of the four forum participants to give a short address, to be followed by open discussion.

All participants spoke unofficially.

Mr. Carl Arth, presently employed by the U. S. Employment Service, stated that one reason for the poor economic condition of the chemist is the poor initial selection by educational institutions of prospective chemists; also that chemists have no bargaining group, such as the engineers, and hence are not in a position to improve their status at present. He also brought out the fact that the U. S. Employment Service is required to furnish applicants for jobs listed. It can, however, assist any organized group, which has certain salary classifications for the group, by advising it what salaried men in these groups are available. He believed that the chemists in this area were in need of a roster and a central office.

Mr. Baker brought out the fact that the chemist is in a poor bargain-

ing position in that he does not have direct contact with the public as a rule and that from a financial point of view the cost of the chemist's education is poorly reimbursed by subsequent earnings. To remedy the situation, he suggested:

(1) Do the same as doctors have done for State Board examinations and licensure.
(2) Legally define the work of a chemist in each industry.
(3) Require chemists to serve an apprenticeship.
(4) Provide a definite scale of wages.
(5) Set up an active chemical organization to function after the attainment of the first three points to see that no harmful conditions arise in the future.

Mr. Morgan Halverson stated,

(1) He was not in favor of licensing, as it would limit the group and hence outstanding chemists would be fewer.
(2) He believed the limiting of the number of chemists should be done in college.
(3) The local roster will be of help.
(4) There was a great necessity for publicity of chemists and chemical work.

Dr. R. V. Stone took sharp issue with the preceding speaker in that he believes licensing does not restrict the number in the profession. He pointed out that Public Health licensure had been established by various steps, finally leading up to a complete program. Specifically, he referred to the laboratory technicians who started on a voluntary basis, then worked up through different stages until final comprehensive examinations and State licensure were secured. He mentioned that one weakness of the laboratory technicians is that there is no pool of money to have a follow-up program. He believes that even with licensing there will be a distinct lack of bargaining position, which can only be overcome by a national definition for chemists.

In the open discussion that followed Mr. Halverson was asked by Mr. Arthur Milner whether he believed a higher salary would be an incentive rather than a deterrent in his schemes. Dr. Herman Maisner brought out the effects of engineer licensing in New York State. Mr. Henning brought out the necessity of the organization functioning as a unit somewhat as a union, and Mr. H. W. Greenhood felt that more than a union attitude was necessary in that the organization should have a high ethical code and contribute more to common good than a plain bargaining union.

Mr. Harry V. Welch believed in the education of more chemists and the reward to those that really achieve. Dr. Roberts brought out the fact that the A.I.C. had many executives in its ranks and hence this was a deterrent for functioning satisfactorily for the employee. He also believed that

unions may carry along the incompetent as well as the worthy.

Mr. Baker then pointed out that along this line chemists do not always get just reward for their services, and that this condition will have to be remedied. Mr. R. J. Abernethy asked Mr. Halverson how to get publicity and Mr. Halverson stated, "Have a publicity committee formed." Dr. E. B. Glaser brought out several inconsistencies in Mr. Welch's review of foreign practice in regard to license. Evidently, the divergence of views resulted from Mr. Welch's survey being made some years ago, and Dr. Glaser's being made recently. Dr. Chittum spoke for licensing and publicity. Dr. Gordon Alles stated that health and safety will have to be accented in order to get chemists licensed effectively, and he doubted whether this can be done satisfactorily. Also on the score of publicity he believes that efforts should start within the A.I.C. organization. Mr. L. F. Pierce spoke along the lines that the suggestions of Dr. Alles demanded too much perfectionism, and that something in regard to licensure, publicity and roster should be done *immediately*. Mr. Abernethy suggested that a committee be appointed to study the procedures followed by other licensed groups.

The meeting then adjourned at 10:30 P. M.

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The Miami Valley Chapter of THE AMERICAN INSTITUTE OF CHEMISTS has become affiliated with the newly founded Dayton Technical Societies Council. The purpose of the Council is to coordinate programs and other activities of the technical societies in the Dayton, Ohio, area. Approximately fifteen technical societies have local sections or chapters in Dayton which will actively participate in the Council. E. L. Luaces, F.A.I.C., was appointed chairman of the committee to draft a constitution for the Council.

Robert J. Moore, F.A.I.C., manager, Development Laboratories of the Bakelite Corporation, Bloomfield, New Jersey, will address the Miami Valley Chapter of THE AMERICAN INSTITUTE OF CHEMISTS, Dayton, Ohio, on April 26th, on the subject of "Synthetic Resin Plastics."

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E. L. Luaces, F.A.I.C., chairman of the Miami Valley Chapter, spoke before the Northern Ohio Chapter of THE AMERICAN INSTITUTE OF CHEMISTS on March 26th, on "The Patent Rights of Employer and Employee Chemists", at the Engineering Societies Building in Cleveland.

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For Your Library

The first issue of *Biometrics Bulletin* was published in February by the American Statistical Association, 1603 K Street, N.W., Washington 6, D.C. This new twelve-page bulletin is devoted specifically to the interests of biological statisticians. Its subscription price is $3.00 a year. Articles featured in the first issue include "Some Uses of Statistical Methods in Medicine," by John R. Minor, of the Mayo Clinic, and "Directly Observable Genetic Changes in Population of Drosophila Pseudoobscura," by Th. Dobyhansky of Columbia University.

G. Frederick Smith, F.A.I.C., and F. P. Richter are authors of "Phenanthroline and Substituted Phenathroline Indicators," a 103-page booklet published by The G. Frederick Smith Chemical Company, 867 McKinley Avenue, Columbus, Ohio.

Foster D. Snell, Inc., has just published a revised edition of "The Consulting Chemist and Your Business," which may be obtained without charge by readers of THE CHEMIST, on request to the company at 305 Washington Street, Brooklyn, N. Y.

The American Foreign Credit Underwriters Corporation, 170 Broadway, New York, has issued the revised 1945 edition of the "Market Guide for Latin America."

The Glycerine Producers' Association, 295 Madison Avenue, New York 17, N. Y., offers to readers of THE CHEMIST, without charge, the booklet, "Nothing Takes the Place of Glycerine—1583 Ways to Use It." This association has just completed a contest for additional uses of glycerine. The first prize was awarded to Hobert D. Young, Diesel Engineer, Sinclair Refining Company, East Chicago, Indiana, who suggested the use of glycerine for various purposes in connection with engine equipment.

Kyrides Forsees "Scientific Vacuum" from U. S. Draft Policy

Lucas P. Kyrides, organic research chief at Monsanto Chemical Company, in accepting, on March fifth at St. Louis, the first Midwest Award of the St. Louis Section of the American Chemical Society for "meritorious contribution to the advancement of chemistry," expressed grave con-

cern over the wartime policy of drafting young scientists.

"By continued drafting of young scientists and by arresting the development of our scientific replacements," said Dr. Kyrides, "we are—in my opinion—setting the stage for a scientific vacuum that will face the nation after this war. Consider the possibility of the war ending tomorrow. It would be six to ten years before there would be a graduating class of Ph.D's.

"England is not drafting her scientific personnel. To the contrary, she is rendering every encouragement to science with the specific purpose of insuring adequate postwar replacements. Even in the darkest days of Stalingrad, Soviet manpower requirements never reached the stage where the U.S.S.R. felt it necessary to call on her scientific men to bear arms.

"This leads to speculation on what we in America will face after the war in competition with other progressive nations—nations which will be adequately equipped with trained scientific replacements. Let us not assume that we can maintain our leadership without continuing to conserve and train scientists. It cannot be done."

Burt Wetherbee, F.A.I.C., resigned from American Resinous Chemicals, Peabody, Massachusetts, as of March first.

Foulke with Foster D. Snell, Inc.

Dr. Gardner Foulke, recently chief chemist for the Garfield Division of Houdaille-Hershey Corporation, has joined the staff of Foster D. Snell, Inc. as director of the Analytical Department.

Corning Glass Works filed with the Securities and Exchange Commission a registration covering 50,000 shares of cumulative preferred stock of $100 par value per share, plus common stock of a par value of $5.00 per share. The preferred stock represents new financing by Corning in connection with a program for improving and expanding manufacturing facilities and plants.

William F. McCandlish, Hercules Powder Company explosives salesman who was captured by the Japs in Manila in 1942 and interned in a prison camp, was among those Americans freed when United States troops captured the Los Banos prison camp.

Robert J. Moore, F.A.I.C., spoke before a meeting of the American Chemical Society in Chicago on March 15th on "Synthetic Resin Plastics". Accompanying the lecture was an exhibit which showed 200 items of Bakelite and Vinylite plastics used in industry and the war effort.

Meeting Dates

April 13. Chicago Chapter, THE AMERICAN INSTITUTE OF CHEMISTS. Huyler's Restaurant, 310 So. Michigan Ave., Chicago. Speakers: Dr. E. C. Williams, vice president and director of research, General Aniline and Film Company.

Apr. 16. Northern Ohio Chapter. Speaker, Dr. Robert J. Moore, Manager, Development Laboratory, The Bakelite Corporation, Bloomfield, N. J. Place of meeting to be announced.

Apr. 18. Meeting. Washington, D. C. Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. Wardman Park Hotel.

April 18. Joint Meeting. Pennsylvania Chapter. THE AMERICAN INSTITUTE OF CHEMISTS, and Philadelphia Section, The American Chemical Society, Engineers' Club, Philadelphia. Speakers: Dr. H. G. Byers, F.A.I.C., "Soil Genesis and Some Soil Properties."

Apr. 19. Meeting. Baltimore Chapter. THE AMERICAN INSTITUTE OF CHEMISTS.

Apr. 19. General Meeting. Los Angeles Chapter, THE AMERICAN INSTITUTE OF CHEMISTS.

Apr. 27. New York Chapter of THE AMERICAN INSTITUTE OF CHEMISTS. Student Medal Presentation, 26th Floor, No. 2 Park Avenue, New York. N. Y. Speaker: Professor Alexander O. Gettler, Toxicologist of the City of New York, "Contributions Chemistry has Made in the Detection of Crime."

May 11-13. Miami Valley Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. Deshler-Wallick Hotel, Columbus, Ohio. Medal Award to John W. Thomas, chairman and directing head, The Firestone Tire and Rubber Company. Program to be announced. Dr. E. L. Luaces, chairman of Committee on Arrangements.

May 17. Business Meeting. Los Angeles Chapter, THE AMERICAN INSTITUTE OF CHEMISTS.

May 17. Dinner and Business Meeting. Baltimore Chapter. THE AMERICAN INSTITUTE OF CHEMISTS. Northway Apartments, Baltimore, 6:30 p. m.

May 25. New York Chapter of THE AMERICAN INSTITUTE OF CHEMISTS. Annual Business Meeting. 26th Floor, No. 2 Park Avenue, New York, N. Y. Speaker: Dr. Wanda K. Farr, Celanese Corporation of America, "Utilization of Plant CellMembranes."

June 1. Chicago Chapter, THE AMERICAN INSTITUTE OF CHEMISTS. Business Meeting.

June 21. General Meeting. Los Angeles Chapter, THE AMERICAN INSTITUTE OF CHEMISTS.

Medal Award Program

THE INSTITUTE medal award to John W. Thomas, chairman of The Firestone Tire and Rubber Company, which was scheduled to be presented at the Annual Meeting of the INSTITUTE, will now be made instead at the regular meeting of the Miami Valley Chapter to be held May 11th at Columbus, Ohio. The INSTITUTE has voluntarily postponed the Annual Meeting to avoid increasing travel.

Speakers at the Medal Award will include: Col. Bradley Dewey, president-elect, American Chemical Society and former U. S. Rubber director; Dr. Hezzleton E. Simmons, president of the University of Akron; Dr. Donald B. Keyes, director of the Office of Production, Research, and Development, War Production Board; John D. Coleman, president of the Dayton Society of Professional Engineers, and supervisor of production processes, Frigidaire Division, General Motors Corporation. The complete program will appear in the May CHEMIST.

Hampel Now with Cardox Corporation

Clifford A. Hampel, F.A.I.C., formerly research chemist with the Minnesota Mining and Manufacturing Company, St. Paul, is now assistant chief chemist of the Cardox Corporation, 307 North Michigan Avenue, Chicago 1, Illinois.

Moore Appointed Technical Co-ordinator of Bakelite

Robert J. Moore, F.A.I.C., formerly manager, Development Laboratories, Bakelite Corporation, Bloomfield, N. J., has been appointed technical co-ordinator of the corporation. After April 15th, Dr. Moore will be located in the New York offices at 30 East 42nd Street.

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ADVERTISING INDEX

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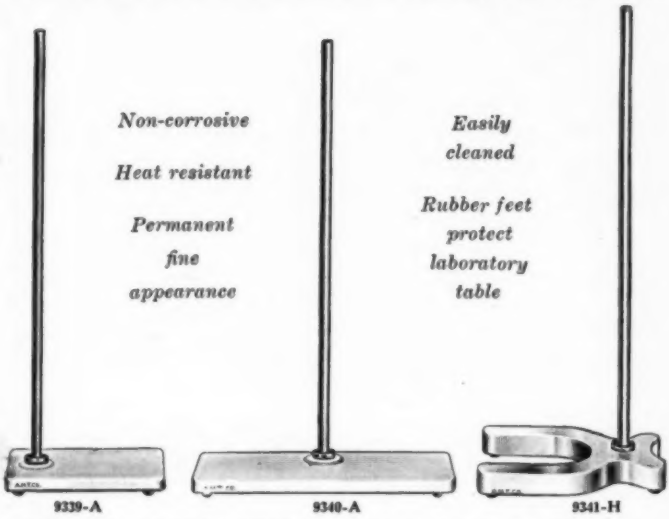

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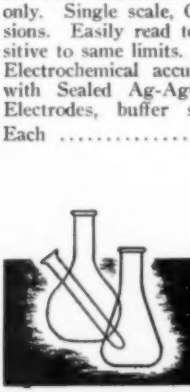

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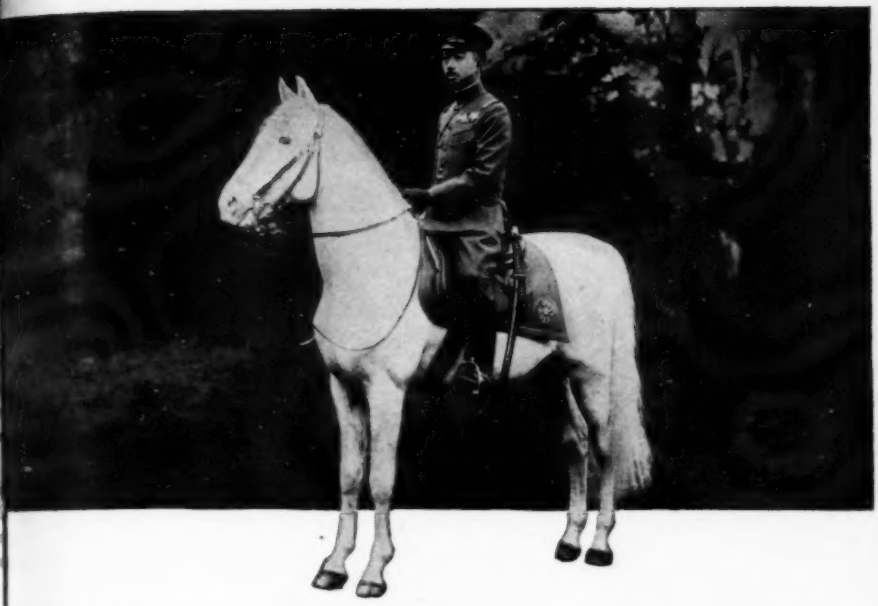

LET'S GET THE ADMIRAL HIS HORSE!

Official U.S. Navy Photo

Admiral Halsey has his eye on a fine white horse called Shirayuki.

Some time ago, at a press conference, he expressed the hope that one day soon he could ride it.

The chap *now* in Shirayuki's saddle is Japan's Emperor—Hirohito.

He is the ruler of as arrogant, treacherous, and vicious a bunch of would-be despots as this earth has ever seen.

The kind of arrogance shown by Tojo—who was going to dictate peace from the White House . . . remember?

Well, it's high time we finished this whole business. High time we got the Emperor off his high horse, and gave Admiral Halsey his ride.

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THE CHEMIST

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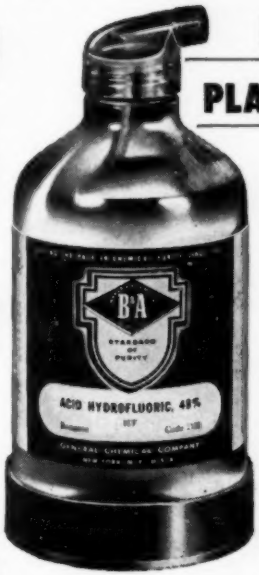

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